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A REVIEW OF THE COPEPOD *SCOTTOCALANUS*
SECURIFRONS (T. SCOTT) AND A NOTE ON
ITS SYNONYM *SCOLECITHRIX CUNEIFRONS* WILLEY
(CALANOIDA: SCOLECITHRICIDAE)

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ABSTRACT

Scottocalanus securifrons from the International Indian Ocean Expedition Collections is described and compared with that of T. Scott 1893, A. Scott 1909, Tanaka 1961, *Lophothrix securifrons* Wolfenden 1904 and *Scolecithrix cuneifrons* Willey 1918. A thorough examination of the descriptions of *securifrons* and *cuneifrons* and the examination of ♀ syntypes of *S. securifrons* from the British Museum revealed a doubtful existence of *Scolecithrix cuneifrons* as a distinct species. Hence it is considered as a synonym of *S. securifrons* in agreement with Vervoort (1965).

INTRODUCTION

While studying the scolecithricid copepods collected during the International Indian Ocean Expedition 1960-65 (IIOE) I encountered a number of specimens of both sexes belonging to the genus *Scottocalanus* Sars. Upon comparing the IIOE specimens with published descriptions of species of *Scottocalanus*, I found good agreement with *S. securifrons* (T. Scott, 1893) and also with *S. cuneifrons* (Willey, 1918). The IIOE specimens are assigned to the older *S. securifrons* and described below.

Scottocalanus securifrons (T. Scott)

(Figure 1 a-g, Figure 2 a-c, Figure 3 a-h)

Scolecithrix securifrons T. Scott, 1893, p. 47, pl. 4, figs. 40-56, pl. 5, fig. 1 [♀ only, ♂ = *Scottocalanus helenae* (Lubbock)].—Giesbrecht and Schmeil, 1898, p. 49.—van Breemen, 1908, p. 76, fig. 88 [♀ only].—Canu, 1896, p. 425.—Thompson, 1903, p. 20.—Norman 1903, p. 137.—Cleve, 1904, p. 197.—Cons. Explor. Mer, 1909, p. 99.—Jespersen, 1940, p. 36.

Lophothrix securifrons Wolfenden, 1904, p. 120, pl. 9, figs. 12-15.

Lophothrix securifrons (T. Scott).—Wolfenden, 1911, p. 268.

Scottocalanus acutus Sars, 1905, p. 7.

Scolecithrix cuneifrons Willey, 1918, p. 194, figs. 17-24.

Scottocalanus securifrons (T. Scott).—Sars, 1905, p. 7 [by implication]; 1912, p. 654; 1924-1925, p. 160-162, pl. 45 figs. 1-8.—Pearson, 1906, p. 19.—Farran, 1908, p. 57; 1920, pp. 18, 21; 1926, p. 267; 1929, p. 251.—Paulsen, 1909, p. 137.—A. Scott, 1909, p. 104, pl. 25 figs. 1-9, pl. 28 figs. 1-9.—Stebbing, 1910, p. 529.—With, 1915, p. 220, pl. 8 fig. 13, text figs. 71-73.—Cons. Explor. Mer, 1916, p. 57.—Lysholm and Nordgaard, 1921, p. 21.—Rose, 1929, p. 26; 1933, p. 144, fig. 144; 1942, p. 148.—Wilson, 1936, p. 91; 1950, p. 340.—Tanaka, 1937, p. 259, figs. 9a-c; 1953, p. 132; 1961, p. 141-143, fig. 106; 1969, p. 275.—Leavitt, 1938, p. 384.—Lysholm, Nordgaard and Wiborg, 1945, p. 26.—Sewell, 1947, p. 143.—Fraser and Saville, 1949a, pp. 61, 63.—Brodsky, 1950, p. 242, fig. 152.—Wiborg, 1955, p. 51.—Hida and King, 1955, p. 11.—Marques, 1956, p. 15; 1958, p. 225; 1959, p. 211.—Heinrich, 1958b, p. 1029.—Vinogradov, 1960, p. 502.—Grice, 1962, p. 213, pl. 19 figs. 12-15.—Grice and Hart, 1962, appendix, tab.—Owre, 1962, p. 492.—Vervoort, 1965, p. 36.—Fleminger, 1967, p. 194.—Owre and Foyo, 1967, p. 63, figs. 98, 400-403, 409, 410.—Park, 1970, p. 476.—Bowman, 1971, p. 34.

Description of the specimens: Female. Length 4.2 mm. Head and first thoracic segment, 4th and 5th thoracic segments fused. Head with high median crest (Fig. 1c). Last thoracic segment produced posteriorly into triangular expansion terminating in sharp pointed spine on either side. Rostrum bifid at tip (Fig. 2 a). Abdomen 4-segmented. Genital segment swollen ventrally at mid-length; its ventral posterior margin overlapping the following segment (Fig. 1 d). Posterolateral margins of genital segment furnished with spines which are absent on dorsal and ventral side (Fig. 1 e). A. Scott (1909) shows spines on the posterior margin of the genital segment present on the dorsal as well as lateral surfaces. Posterior margins of 2nd and 3rd abdominal segments with a hyaline fringe (Fig. 1 e). Anal segment very short. Caudal rami almost as wide as long, each with 4 setae.

First antenna with 23 separate segments, when the partly separated 8th and 9th segments are counted as one (Fig. 1 a). First maxilla with

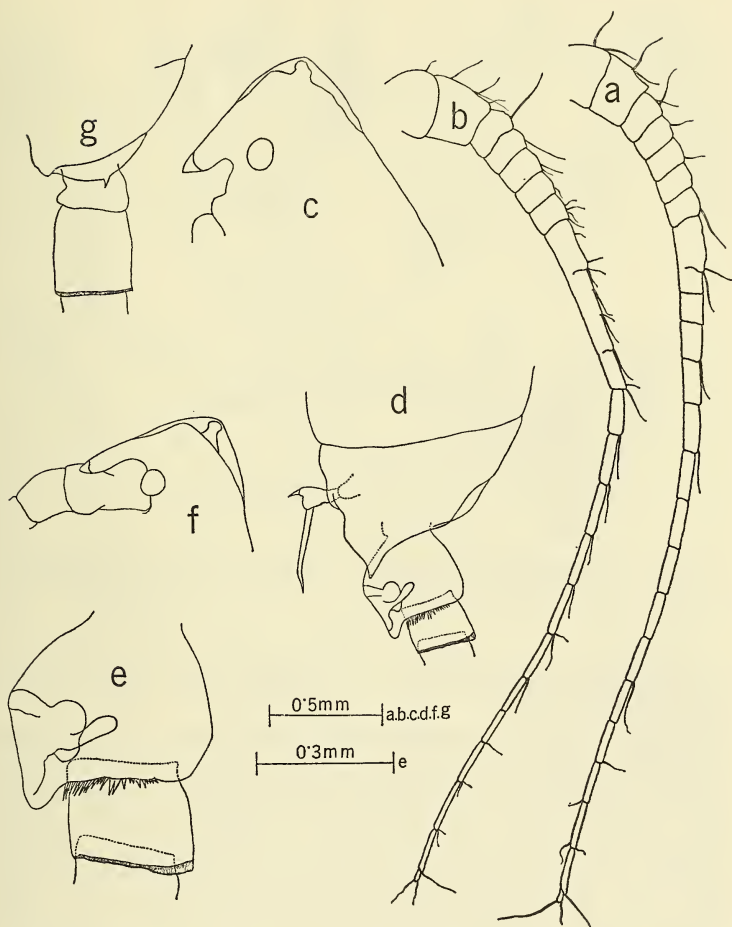


FIG. 1. *Scottocalanus securifrons*. a, 1st antenna ♀; b, 1st antenna ♂; c, frontal profile ♀; d, last thoracic segment and genital segment ♀; e, genital segment ♀, enlarged; f, frontal profile ♂; g, last thoracic segment ♂.

numbers of setae on different lobes as follows (Fig. 2 b): Inner lobe 1 with 12 setae of which 3 are on posterior surface; inner lobe 2 with 2 setae; inner lobe 3 with 3 setae; basipod 2 with 5 setae; endopod segment 1 with 3 setae; endopod segments 2 and 3 together with 4 setae; exopod with 8 setae; outer lobe with 9 setae. Exopod segment with fine surface hairs at distal end. Second maxilla endopod with 4 bud-like and

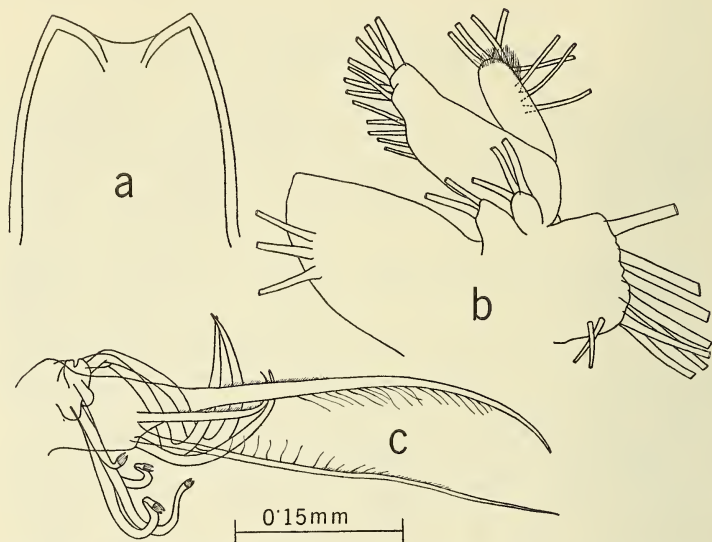


FIG. 2. *Scottocalanus securifrons*. a, rostrum ♀; b, 1st maxilla ♀; c, distal portion of 2nd maxilla ♀.

3 vermiform filaments (Fig. 2 c). Swimming legs 1-4 as shown in figures (Figs. 3 a-d).

Fifth pair of legs asymmetrical; subapical spine of left leg thicker than that of right leg. Subapical spines with two rows of teeth (Fig. 3 e).

Male. Length 4.57 mm. General appearance similar to that of female. Head with high median crest (Fig. 1 f). Last thoracic segment terminating in small spine on either side (Fig. 1 g). Abdomen 5-segmented. Posterior margin of 2nd to 4th abdominal segments with hyaline fringe (Fig. 1 g). First antenna with 20 segments when fused 8th to 12th segments, partly divided by 2 incomplete sutures between segments 8 and 9 and 11 and 12, are counted as one (Fig. 1 b). 5th leg as illustrated (Fig. 3 f-h). The small teeth on the inner margin of the proximal joint of the endopod of the left leg figured by A. Scott are not present in Tanaka's specimens, Willey's specimens or in the IIOE specimens.

DISCUSSION

The IIOE specimens agree well with descriptions of *S. securifrons* by T. Scott (1893, ♀ only), A. Scott (1909), Wolfenden (1904), and Tanaka (1961). They also appear to conform to Willey's (1918) description of *S. cuneifrons*. Willey was aware of the similarity of his *S. cuneifrons* to *S. securifrons*, and stated that he was at first inclined to identify his specimens as *S. securifrons*, but decided to establish a

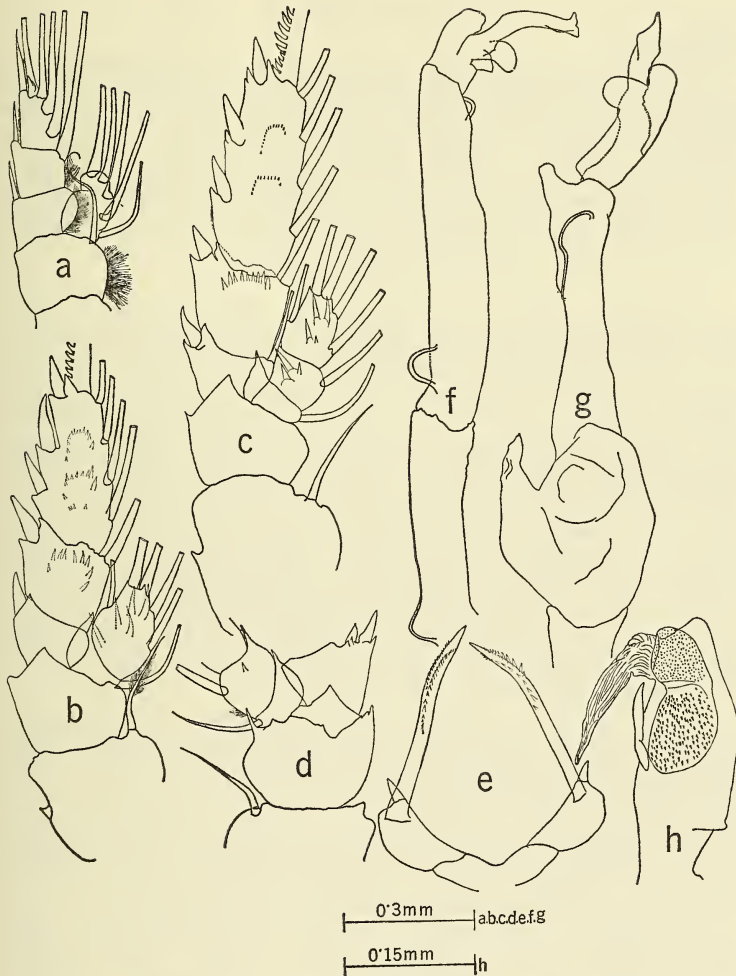


FIG. 3. *Scottocalanus securifrons*. a, 1st leg ♀; b, 2nd leg ♀; c, 3rd leg ♀; d, proximal portion of 4th leg ♀; e, 5th leg ♀; f, left 5th leg ♂; g, right 5th leg ♂; h, left 5th leg ♂, 2nd joint of Re, enlarged.

new species for them because the male fifth legs of his specimens differed from those of *S. securifrons*. Apparently he was referring to T. Scott's male, which is now believed to belong to a different species, *Scottocalanus helenae* (Lubbock), and not to the male described by A. Scott which had a fifth leg very similar to that of *S. cuneifrons*. Curiously,

Willey did not cite either T. Scott (1893) or A. Scott (1909) in his bibliography.

In order to be certain about the identity of T. Scott's specimens, I requested a loan of them from The British Museum (Natural History). Although Scott (1893) reported *S. securifrons* from 5 "Buccaneer" stations, Dr. Roger J. Lincoln reported that the British Museum had only 2 females, the male being missing. Upon examining these 2 females, I found that one of them is not *S. securifrons* but another species of *Scottocalanus*, possibly *S. australis* Farran (1936). The remaining female is herewith designated as the lectotype of *Scolecithrix securifrons* T. Scott in order to obviate further confusion.

Distribution: The species has a fairly wide distribution, and has been recorded from the Atlantic, Pacific and Indian Oceans. It has been recorded from the central and southern part of the Arabian Sea (Sewell, 1947), from the Indian Ocean off Port Shepstone, South Africa (Cleve, 1904a), from many localities in the eastern part of the Malay Archipelago (A. Scott, 1909, and Snellius Expedition), from the Philippine Islands region (Wilson, 1950), from the central equatorial Pacific, 00°03'N, 157°00'E (Grice, 1962), from the California Current region (Fleminger, 1967), from Sagami and Suruga Bays, Izu region, Japan (Tanaka, 1937, 1961) from surface waters off Three Kings Islands, New Zealand (Farran, 1929), from many localities in the West-Pacific ranging from off Peru to the Galapagos Islands region (Wilson, 1950) and from the Far Eastern and Polar Seas of the U.S.S.R. (Brodsky, 1950). The specimens described in this paper are from around the central part of the equatorial Indian Ocean (03°29'N, 77°54'E).

In the Atlantic *S. securifrons* is widely distributed over large areas, penetrating at least as far north at the Atlantic slope off Cabot Strait, 42°31'N, 63°31.5'W (Willey, 1918) and 43°18'N, 60°11'W (Rose, 1929). Also known from 47°47'–63°08'N, 8°00'–26°20'W (With, 1915; Lysholm and Nordgaard, 1921); the South coast of Iceland, 63°08'N, 21°30'W; 62°47'N, 15°03'W (Paulsen, 1909; Jespersen, 1940); the Faroe Channel, ± 60°N, 7°W (Norman, 1903; Wolfenden, 1904); 28°–58°N, 7°–50°5'W (Lysholm, Nordgaard and Wiborg, 1945); NNW of Achill Head, Ireland (Norman, 1903); 52°06'–54°33'N, 10°30'–15°53.9'W (Thompson, 1903; Farran, 1908); off the south-west coast of Ireland (Farran, 1920); 27°43'–47°43'N, 8°06'–42°40.5'W (Sars, 1925); Bermuda (Wilson, 1936); 30°08'N, 31°19'W (Sars, 1912); Florida current (Owre, 1962); between Bermuda and New York (Grice and Hart, 1962); Bay of Biscay ± 47°N, 8°W (Farran, 1926); 44°17'N, 4°38'W (Canu, 1896); 20°41'N, 31°53'W; 17°28'N, 29°42'W; 16°24'N, 28°53'W (Wolfenden, 1911); Gulf of Guinea (T. Scott, 1894); off Angola (Marques, 1956, 1958, 1959); 26°59'S, 17°06'W and 35°10'S, 2°33'W (Wolfenden, 1911). It has been captured in the northern part of the North Sea during the periodical plankton investigations, 1902–1908 (Cons. Explor. Mer 1909, Scottish area). It has been recorded from the southeastern United States between Cape Hatteras and Southern Florida (Bowman, 1971).

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